State Environmental Planning Policy (Resilience and Hazards)

Site 10 (Magna) - 981 New England Hwy, Aberdeen 2336

Hive Battery Developments Pty Ltd
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Hive Battery Developments Pty Ltd

Prepared by

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Rev	Date	Remarks	Prepared By	Reviewed By
A	12 October 2023	Draft issue for comment	Renton Parker	Jason Costa
0	12 October 2023	Issued final		

Executive Summary

Background

Hive Battery Developments Pty Ltd (HBD) has proposed to develop a Battery Energy Storage System (BESS) located at Site 10 (Magna) 981 New England Hwy, Aberdeen 2336, including the storage of ten (10) battery units.

The Council has requested that the proposed development be subject to an assessment against Chapter 3 of the State Environmental Planning Policy – Resilience and Hazards (SEPP-RH, Ref. [1]) has been conducted to support the Development Application (DA) submission.

HBD has commissioned Riskcon Engineering Pty Ltd (Riskcon) to prepare a Chapter 3 assessment for the facility to determine whether the risk profile is acceptable for the location. This document represents the SEPP-RH assessment for Site 10 (Magna) 981 New England Hwy, Aberdeen 2336.

Conclusions

A review of the quantities of DGs stored at the proposed facility and the associated vehicle movements was conducted and compared to the threshold quantities outlined in Chapter 3 of SEPP (Resilience and Hazards). The results of this analysis indicates the threshold quantities for the DGs to be stored and transported are not exceeded; hence, the Chapter 3 of SEPP (Reslience and Hazards) does not apply to the project. Futhermore, a review of the potential to cause offense was conducted which indicated the site operations would be unlikely to occur at levels, which would cause offense.

In addition, the cumulative impacts were assessed considering the adjacent BESS developments which indicated the combined dischage capacity would remain below the threshold and that additional assessment based on cumulative impacts would not be required.

As the facility is not classified as potentially hazardous or offensive, it is not necessary to prepare a Preliminary Hazard Analysis for the facilty as Chapter 3 of SEPP (Reslience and Hazards) does not apply.

Recommendations

No recommendations have been made as a result of the assessment.

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Abbreviations

Abbreviation	Description
ADG	Australian Dangerous Goods Code
APZ	Asset Protection Zone
BESS	Battery Energy Storage System
DA	Development Application
DGs	Dangerous Goods
DPE	Department of Planning and Environment
LFP	Lithium Iron Phosphate
RH	Resilience and Hazards
SEPP	State Environmental Planning Policy

1.0 Introduction

1.1 Background

Hive Battery Developments Pty Ltd (HBD) has proposed to develop a Battery Energy Storage System (BESS) located at Site 10 (Magna) 981 New England Hwy, Aberdeen 2336, including the storage of ten (10) battery units.

The Council has requested that the proposed development be subject to an assessment against Chapter 3 of the State Environmental Planning Policy – Resilience and Hazards (SEPP-RH, Ref. [1]) has been conducted to support the Development Application (DA) submission.

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1.2 Scope of Services

The scope of work is to prepare a SEPP-RH assessment for the facility located at Site 10 (Magna) 981 New England Hwy, Aberdeen 2336. The assessment does not include any other sites or the preparation of any additional planning studies should they be required.

1.3 Qualifications of the Assessor

The assessment will be performed by Renton Parker who is a Director at Riskcon Engineering Pty Ltd. Renton is a chartered chemical engineer with 11 years of experience working the field of risk engineering dealing specifically with Dangerous Goods consulting. He is a full member of the Australasian Institute of Dangerous Goods Consultants (AIDGC) in addition he has held roles as President, Vice President and Board Member of the AIDGC. He is a listed hazards and risk consultant under the Three Ports SEPP. Renton has performed numerous risk, DG, and fire assessments for industrial facilities storing DGs and other materials with unique hazards ranging from minor storage below SEPP-RH up to Major Hazard Facilities.

2.0 Methodology

2.1 General Methodology

The methodology used in this assessment is as follows:

- Review the types and proposed quantities of DGs to be stored at the site.
- Compare the quantities of DGs the threshold quantities listed in "Applying SEPP 33 – Hazardous and Offensive Development" (Ref. [1]) to identify whether the storage location or quantity triggers SEPP 33.
- Review the likely vehicular movements involving DGs and compare against the applicable thresholds detailed in Applying SEPP 33 (Ref. [1]).
- Report on the findings of the SEPP 33 assessment.

2.2 Data taken from "Applying SEPP 33"

Figure 2-1, extracted from "Applying SEPP 33" provides details on the application of Figures or Tables from the same document to determine the applied screening Threshold (Ref. [1]).

Class	Method to Use/Minimum Quantity
1.1	Use graph at Figure 5 if greater than 100 kg
1.2-1.3	Table 3
2.1 — pressurised (excluding LPG)	Figure 6 graph if greater than 100 kg
2.1 — liquefied (pressure) (excluding LPG)	Figure 7 graph if greater than 500 kg
LPG (above ground)	table 3
LPG (underground)	table 3
2.3	table 3
3PGI	Figure 8 graph if greater than 2 tonne
3PGII	Figure 9 graph if greater than 5 tonne
3PGIII	Figure 9 graph if greater than 5 tonne
4	table 3
5	table 3
6	table 3
7	table 3
8	table 3

Figure 2-1: Screening Method to be Used

Table 3 from "Applying SEPP 33" has been extracted and is shown in **Figure 2-2**.

Class	Screening Threshold	Description
1.2	5 tonne	or are located within 100 m of a residential area
1.3	10 tonne	or are located within 100 m of a residential area
2.1	(LPG only — not including automotive retail outlets[1])	
	10 tonne or16 m^3	if stored above ground
	40 tonne or 64 m^3	if stored underground or mounded
2.3	5 tonne	anhydrous ammonia, kept in the same manner as for liquefied flammable gases and not kept for sale
	1 tonne	chlorine and sulfur dioxide stored as liquefied gas in containers <100 kg
	2.5 tonne	chlorine and sulphur dioxide stored as liquefied gas in containers >100 kg
	100 kg	liquefied gas kept in or on premises
	100 kg	other poisonous gases
4.1	5 tonne	
4.2	1 tonne	
4.3	1 tonne	
5.1	25 tonne	ammonium nitrate — high density fertiliser grade, kept on land zoned rural where rural industry is carried out, if the depot is at least 50 metres from the site boundary
	5 tonne	ammonium nitrate — elsewhere
	2.5 tonne	dry pool chlorine — if at a dedicated
		pool supply shop, in containers <30 kg
	1 tonne	dry pool chlorine — if at a dedicated pool supply shop, in containers >30 kg
	5 tonne	any other class 5.1
5.2	10 tonne	
6.1	0.5 tonne	packing group I
	2.5 tonne	packing groups II and III
6.2	0.5 tonne	includes clinical waste
7	all	should demonstrate compliance with Australian codes
8	5 tonne	packing group I
	25 tonne	packing group II
	50 tonne	packing group III

Figure 2-2: General Screening Threshold Quantities

Transportation screen thresholds have been provided in **Figure 2-3**.

	Vehicle Movements		Minimum quantity* per load (tonne)	
	Cumulative	Peak		
Class	Annual *or*	Weekly	Bulk	Packages
1	see note	see note	see note	
2.1	>500	>30	2	5
2.3	>100	>6	1	2
3PGI	>500	>30	1	1
3PGII	>750	>45	3	10
3PGIII	>1000	>60	10	no limit
4.1	>200	>12	1	2
4.2	>100	>3	2	5
4.3	>200	>12	5	10
5	>500	>30	2	5
6.1	all	all	1	3
6.2	see note	see note	see note	
7	see note	see note	see note	
8	>500	>30	2	5
9	>1000	>60	no limit	

Figure 2-3: Transportation Screening Thresholds

3.0 Project Description

3.1 Site Location and Layout

The proposed facility is located at Site 10 (Magna) 981 New England Hwy, Aberdeen 2336 which is located approximately 135 km northwest of the Newcastle. **Figure 3-1** shows the regional location of the site in relation to Newcastle.

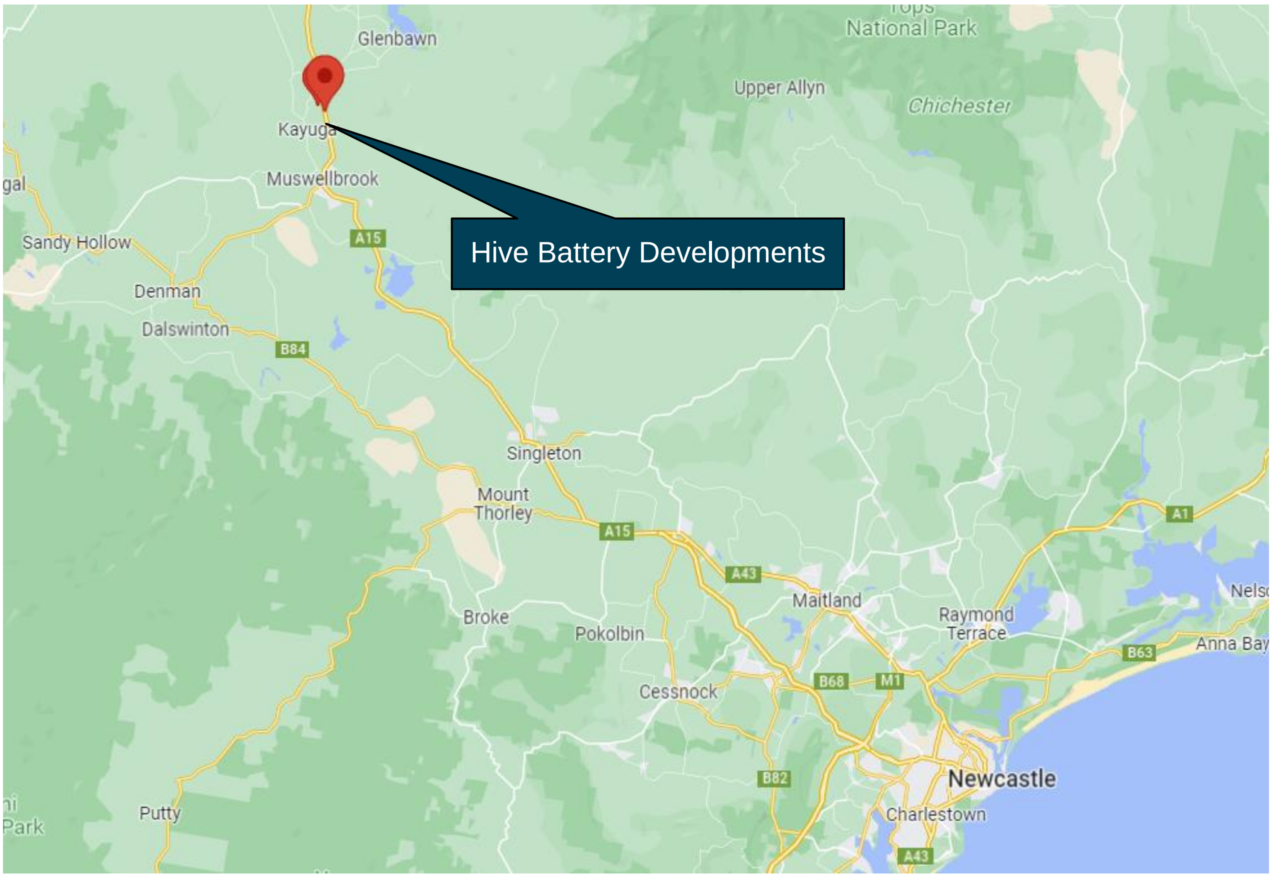

Figure 3-1: Site Location (source Google Maps)

3.2 General Description

The BESS storage will be composed of 10 x battery cubes each having a capacity of 2.7 MW each. The systems will be capable of charging and dispatching at 5 MW x 4 hours or 20 MWh. The systems will typically cycle through a charge / discharge cycle 1.7 times a day.

The BESS will utilise a Lithium Iron Phosphate (LFP) chemistry from Sungrow, specifically the Sungrow STUX2754 Power Titan Battery Cubes. This particular option includes a management system and liquid cooling to monitor temperature fluctuations of the batteries and cool the batteries to prevent thermal runaway. The site will also include a Power Conversion System running at 4.98 MW housing 4 inverters, Switch room, and auxiliary power room. An indicate image of the BESS cubes is shown in **Figure 3-2**.

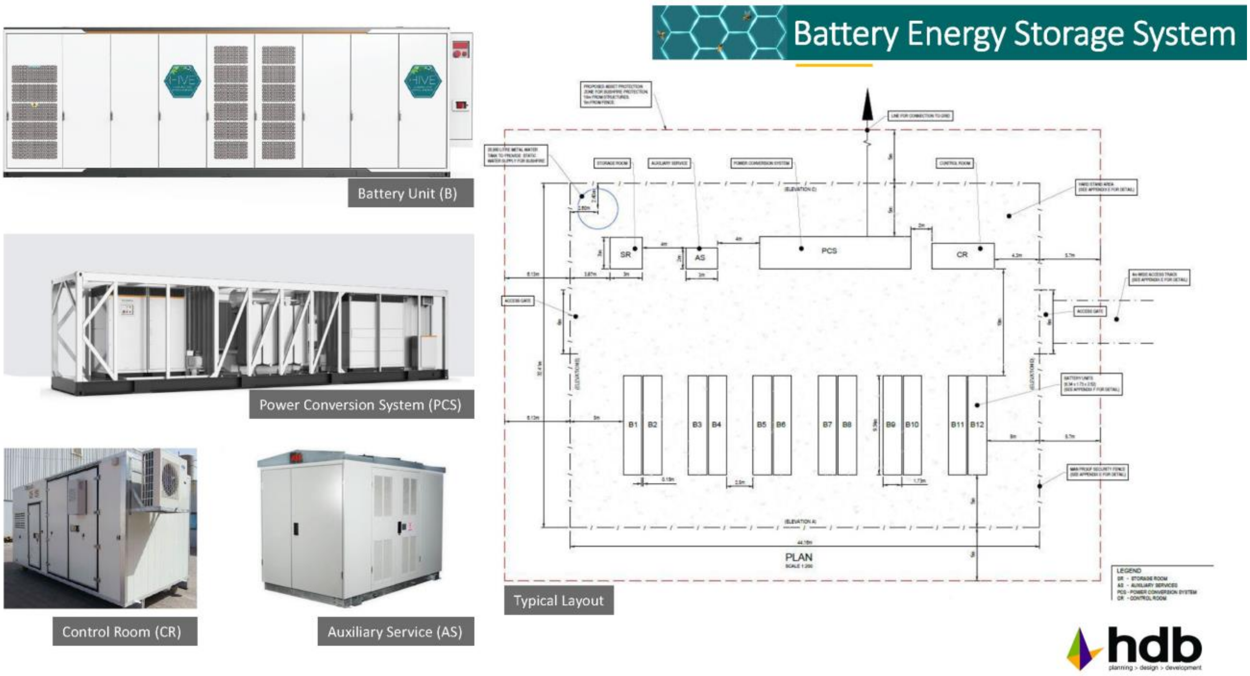

Figure 3-2: Battery Cubes and Ancillary Systems

The site layouts are shown in **Figure 3-3** and **Figure 3-4** which includes a compound with dimensions of 33 m x 44 m resulting in an area of 1,435 m^2. It is bounded by a 2.4 m high fence and has a 10 m wide Asset Protection Zone (APZ).

Figure 3-3: Indicative Side View 1

Figure 3-4: Indicative Side View 2

4.0 SEPP Review

4.1 Proposed Storage Details

The maximum quantities of products that are to be stored at the installation, are shown in **Table 4-1**. The data has been provided by HBD for the Seahm BESS. Provided in **Table 4-1** is an assessment of whether the Class is subject to SEPP. Based on the assessment, the materials stored are not subject to the SEPP.

Table 4-1: DG Classes or Materials Stored and Maximum Quantities

Class	Description	PG	Quantity (kg)	Class Subject to SEPP 33 (Y/N)
9	Lithium-ion batteries	III	264,000^	N
C1	Transformer oils	n/a	2,800 L / 2,240*	N

^26,400 per unit from specification sheet

*Based upon a density of 800 kg/m^3

4.1.1 Energy

While not documented in "Applying SEPP 33", the DPE has issued informal guidance providing a separate threshold for BESS to determine whether additional assessment is required. The threshold for the BESS is a discharge of 30 MW. As the batteries have a discharge capacity, they are therefore subject to further assessment under the informal guidance.

Provided in **Table 4-2** is an assessment of whether the project will exceed the SEPP threshold. Based on the assessment, the discharge capacity would be below the threhsold; hence, the risks posed by the development would be considered to be acceptable for the proposed location and that no further risk assessment would be required.

Table 4-2: BESS Discharge Assessment

BESS Chemistry	Discharge Capacity (MW)	Threshold (MW)	SEPP Exceeded (Y/N)
LFP	5	30	N

4.1.2 Storage

A review of **Table 4-1** indicates that there are no materials that are assessable against Chapter 3 of SEPP-RH. Therefore, the thresholds within the policy would not be exceeded; hence, an offsite impact would not be expected to occur. As no offiste impact would be expected, the risk profile of the area would be considered acceptable.

Furthermore, A review of the batteries proposed to be used as part of this project indicates the battery chemistry is lithium-Ion phosphate (LiFePO4, or simply LFP) which are considered to be one of the safest battery chemistries within the industry. When exposed to external heat the thermal rise of typical lithium-ion battery chemistries is 200-400 ^oC/min resulting thermal run away and fire which can then propagate to adjacent batteries escalating the incident to a full container fire.

For LFP batteries, the thermal rise of the batteries at peak is 1.5^{o}C/min which results in a gradual temperature rise and does not result in fire and thus incident propagation to other batteries. The thermal rise of various battery chemistries is provided in **Figure 4-1** with a zoomed in temperature rise for LFP provided in the top right of **Figure 4-1**. The stability of the batteries is due to the cathode which does not release oxygen therefore preventing violent redox reactions resulting in rapid temperature rise as the oxygen oxides the electrolyte.

Additional testing for shock and damage to batteries (i.e. nail puncture test) has been shown that LFP batteries when punctured through membranes which typically results in a shorting of the battery and fire does not result in ignition of the battery demonstrating that the battery chemistry is protected against shock damage.

In the event that LFP chemistries do ignite by artificial means, the combustion by products release carbon dioxide which reduces the oxygen concentration within a confined space reducing the combustion rate. Finally, the containers are fitted with a fire suppression system which will activate to suppress and control a fire preventing escalation to other battery units.

Based upon the inherent protection afforded by LFP chemistries, it is considered that a thermal runaway event and subsequent battery container fire is not a credible scenario which aligns with the findings of the threshold-based assessment per the Chapter 3 thresholds.

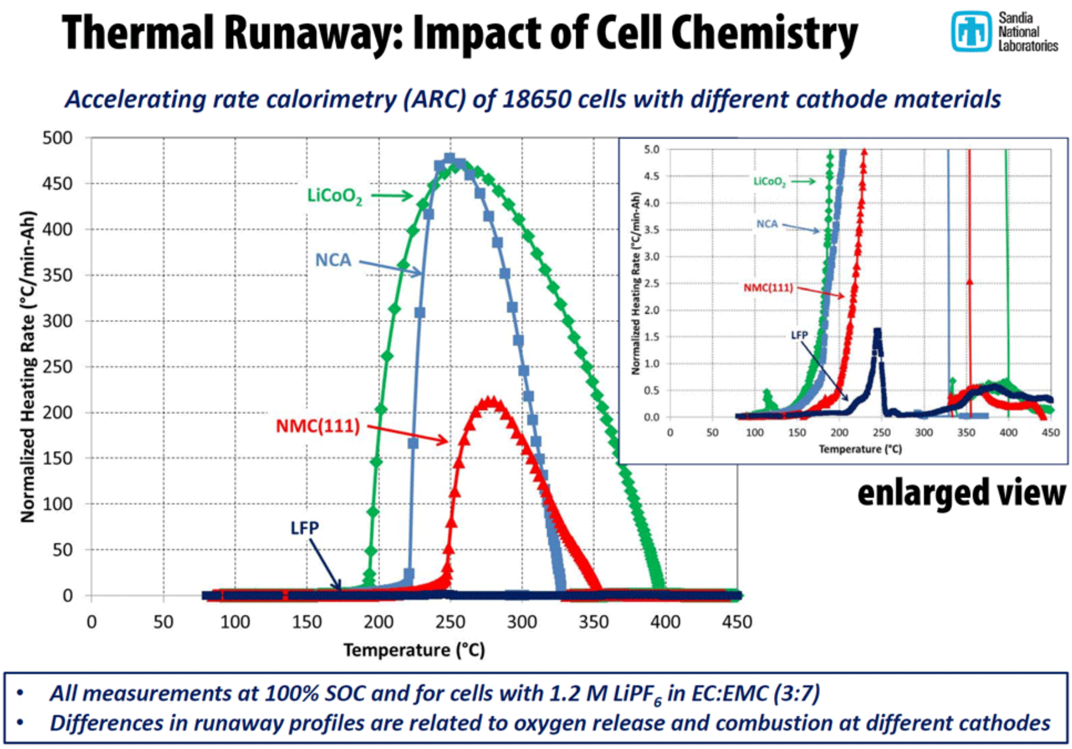

Figure 4-1: Temperature Rise of Lithium-Ion Battery Chemistries (Ref. [2]).

In addition to the inherent safety of this chemistry, the Sungrow battery pack is incorporated with a management system and liquid cooling. Therefore, the in unlikely event that the temperatures do begin to rise within the batteries, the liquid cooling system is able to provide a level of protection by removing the heat in line with the gradual rise of the batteries.

Based upon the above, it is considered that the risks posed by the BESS are low and are unlikely to result in significant offsite impacts. Therefore, it is considered that the BESS would be suitable for the land use.

4.1.3 Transport

DGs will not be transported to the site on a regular basis and are only transported to the site as part of the initial construction. Therefore, the transport thresholds would not be exceeded; hence, SEPP-RH would not apply based upon transport.

4.1.4 Cumulative Impacts

A review of the area indicates that there will be two (2) other BESS installations within the vicinity of this BESS. Each of the surrounding BESS are identical in design resulting in a 5 MW discharge capacity. Due to the proximity of the adjacent BESS the cumulative impact of the BESS has been considered to determine whether the sites together would result in an impact that may result in unacceptable risk and require additional assessment.

As noted, the BESS have a discharge capacity of 5 MW; hence, the 3 sites together would result in a total discharge capacity of 15 MW. Therefore, the cumulative impact of the BESS together would be below the threshold of 30 MW discharge capacity. Subsequently, it is considered that the cumulative impact of the developments would not result in an unacceptable risk and that no further assessment would be required.

5.0 Conclusion and Recommendations

5.1 Conclusions

A review of the quantities of DGs stored at the proposed facility and the associated vehicle movements was conducted and compared to the threshold quantities outlined in Chapter 3 of SEPP (Resilience and Hazards). The results of this analysis indicates the threshold quantities for the DGs to be stored and transported are not exceeded; hence, the Chapter 3 of SEPP (Reslience and Hazards) does not apply to the project. Futhermore, a review of the potential to cause offense was conducted which indicated the site operations would be unlikely to occur at levels, which would cause offense.

In addition, the cumulative impacts were assessed considering the adjacent BESS developments which indicated the combined dischage capacity would remain below the threshold and that additional assessment based on cumulative impacts would not be required.

As the facility is not classified as potentially hazardous or offensive, it is not necessary to prepare a Preliminary Hazard Analysis for the facilty as Chapter 3 of SEPP (Reslience and Hazards) does not apply.

5.2 Recommendations

No recommendations have been made as a result of the assessment.

6.0 References

[1] Department of Planning, “Applying SEPP 33,” Department of Planning, Sydney, 2011.

[2] Power Tech Systems, “Safety of Lithium-Ion batteries,” Power Tech Systems, 2022. [Online]. Available: https://www.powertechsystems.eu/home/tech-corner/safety-of-lithium-ion-batteries/. [Accessed 13 April 2022].